NOAA Teacher at Sea
Lesson Plan

Activity Title: Shark Expedition

Subject (Focus/Topic): Animal Classification

Grade Level: Grade 5

Average Learning Time: three 45 min. sessions

Lesson Summary (Overview/Purpose):
Students will identify the structural and behavioral characteristics of sharks in the Gulf of Mexico and determine the classification of each shark.

Overall Concept (Big Idea/Essential Question): In order for scientists to understand the diversity of our world, scientists classify organisms by both their structural and behavioral characteristics. The classification system begins with a wide group of organisms that becomes narrower as the characteristics become more specific.

Specific Concepts (Key Concepts):
*Students will understand all living things are grouped by how they are similar.
*Students will understand that scientists have created a classification system so that our world can be
  explained in an orderly manner.
*Students will understand that the farther down you go on the classification system, the greater the
  number of characteristics that organisms have in common or are similar.

Focus Questions (Specific Questions):
What does it mean to classify living and nonliving things?
How do we classify living things?
What are the characteristics of all living things?
Why do we classify?
What is the scientific classification system and how do scientists use it?
Why is it important that scientists have a classification system in place?

Objectives/Learning Goals:
*Students will be able to name the different levels of the classification system.
*Students will identify four physical characteristics of sharks and how show how the genus and specie
  differ from one another. They will accomplish this task accurately 85% of the time.
*Students will record the data from the random sampling of the sharks that they have caught and present
  the data in the form of a bar graph.

Background Information:
*Students will have an understanding of random sampling.
*Students will be able to identify the basic anatomy of sharks.

*Students, through the anticipatory set, understand the concept of how to classify living and non living
  things.

Common Misconceptions/Preconceptions:
*All sharks are very large and attack humans.
*All sharks are classified the same.
*Sharks are not fish.

Materials:
NMFS/SFSC Saltwater Recreational Shark ID chart available through NOAA, data collection worksheet, images of shark species, beige broadcloth fabric, fishing line, beach sand (if available), paper clip, magnets, oak tag and chart paper.
Art project: black, beige/brown, grey and white clay plastic knives, and wax paper

Technical Requirements: laptops

Teacher Preparation:
*Create an ocean floor habitat using the broad cloth. The physical features can be made out of clay and
  beach sand.
*Making the sharks: The Additional Resource section has images of some of the sharks that are living in
  the Gulf of Mexico. Make copies of the images and cut them out. Backing them with oak tag will give
  them stability. Put a small hole in the shark images and slide one end of the paperclip through the hole.
  This will act as the fishhook. Each fishing station will have multiple images of the sharks.
*Attach the magnet to the fishing line, which they will use to catch the sharks.
*Make a copy of the data collection sheet for each student.
*Determine number of students for small groups (four students works best).

Keywords: classification system, structural and behavioral features, characteristics and random sampling

Pre-assessment Strategy/Anticipatory Set (Optional):
As a full class students will brainstorm a variety of foods found in their local grocery store.
Working in small groups students will put the foods into groups based on they're similarities.
Students will report out the groups they have made and will explain the rationale for each.
This lesson will be set up as a simulation, in which students will catch their sharks by bottom longlining fishing.

Lesson Procedure:
  Part 1
   Students work in small groups brainstorming food items that can be purchased at a grocery
      store. Have students chart how they would sort their food products (meat, fish, dairy,
      desserts, etc.).

Each group will report out their results and explain their thinking.

As a full class, students will look for similarities and differences of all the charts. Points for discussion: 1. Accuracy and completeness of information charted. 2. Students should notice that they began with large categories and as they continued to sort the categories included fewer items that had many of the same features. 3. The same information was organized in a different way. The discussion should lead to the idea that scientists must use the same language and have the same organizational system in order for them to communicate with colleagues around the world.

Introduce the classification system

Part 2

Set up the ocean habitat in various locations (survey stations) around the room. Each small group fishes (longlining) for two minutes. and will record their catch on the data collection sheet.

Using the data collection sheet, students record their catch and draw the structural features of each shark.

Using the NMFS/SFSC Salt Water Recreational Shark ID chart and the data collection sheet, students determine the classification of each shark. Students record the sharks' common name and scientific name.

Upon completion, bring the class together to discuss the structural features they used to determine the genus and specie of each shark. Ensure they have made the correct determinations and how this could be helpful to scientists around the world.

Each group will show their data by creating a bar graph. They will analyze their data and generalizations

Assessment and Evaluation:
*Students accurately draw the structural features of the sharks.
*Students accurately determine the scientific and common names of five sharks.
*Students create a bar graph of their data that is accurate and well presented.

Extension:
Art project: Students create a clay sculpture of their favorite specie of shark using the structural characteristics data they previously recorded.
Students research a shark of their choice in order to better understand the structural features of sharks and how they classified.

Standards:
• **National Science Education Standard(s) Addressed:**
 Life Science:
 Content Standard A
  Abilities necessary to do scientific inquiry
  Understandings about scientific inquiry
 Content Standard D
  Populations and ecosystems
  Diversity and adaptations of organisms.
  Structure and function in living systems
  List all the National Science Education

• **Ocean Literacy Principles Addressed:**
 The Ocean supports a great diversity of life and ecosystems.

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Ocean life ranges in size from the smallest virus to the largest animal that has lived on Earth, the blue whale.

Some majors groups are found exclusively in the ocean. The diversity of major groups of organisms is much greater in the ocean than on land.

Ocean biology provides many unique examples of life cycles, adaptations and important relationships among organisms (symbiosis, predator-prey dynamics and energy transfer)
that do not occur on land.

• **State Science Standard(s) Addressed:**
  Maine: E1 Biodiversity: Students compare living things based on their behavior, external features and environment.

  B1: Skills and Traits of Scientific Inquiry: Students conduct and communicate results of simple investigations.
  a.   Ask questions and make observations about objects, organisms, and events in the environment.
  b.   Safely conduct simple investigations to answer questions.
  c.   Use simple instruments with basic units of measurement to gather data and extend the senses.

  d.   Know what constitutes evidence that can be used to construct a reasonable explanation.
  e.   Use writing, speaking, and drawing to communicate investigations and explanations.
  E1: Describe how living things can be sorted in many ways, depending on which features or behaviors are used to sort them, and apply this understanding to sort living things.

• **National Council of Teachers of Mathematics-NCTM**
  Data Analysis and Probability: Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.

Additional Resources:
Books:
Parsons, Glenn. Sharks, Skates and Rays of the Gulf of Mexico. University Press of Mississippi, MI, 2005.

Informational Links:
http://www.nmfs.noaa.gov/sfa/hms/sharks/2008/Rec_shark_ID_placard.pdf

http://www.discoveryeducation.com/

http://dsc.discovery.com/videos/shark-week/

Image Links:
http://www.photolib.noaa.gov/700s/fish4137.jpg

http://planetgreen.discovery.com/feature/scalloped-hammerhead.jpg

http://blogs.bootsnall.com/stevieblunder/files/2008/09/blacktip-reef-shark-swimming.jpg

http://img.metro.co.uk/i/pix/2008/02/SharkAP_450x300.jpg

http://atlantictaxidermy.com/atlantic_fm/enlarge.cfm?ImageName=Bullshark_710.jpg

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http://www.richardseaman.com/Underwater/Belize/FishYouMightNotWantToMeet/NurseShark.jpg

http://static.wix.com/media/e9d47f3c0b1f24e8f12a58909134d380.wix_mp

http://www.pelagic.org/biology/ext_anatomy.html

http://farm1.static.flickr.com/98/256003975_524e5c3f6f.jpg

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Data Collection for Shark Survey

Shark Characteristics	Shark	Shark	Shark
Size 3'-6', 6'-10', over 10'			
Dorsal fin			
Shape of snout Very pointed Pointed Blunt			
Shape of caudal fin			

Common name   _____   _____   _____
Scientific name   __ _____   _____   _____

Eye   Spiracle   Fin Spine   Dorsal Fin   Lateral Line   Caudal Fin

Second Dorsal Fin

Nostril

Gill Slits

Teeth

Claspers
(male only)

Anal Fin

Pelvic Fins

Pectoral Fins